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ABSTRACT

This publication serves as a guide to activities and strategies in environmental education. Lesson plans include objectives and suggested procedures in dealing with the following environmental concepts: (1) The earth is a vast but limited natural system; (2) The total environment is in constant change; (3) A living thing is the product of its heredity and environment; and (4) All living things, including man, are interdependent with one another and with their environment. The activities vary in complexity and amount of student activity. (Author/RH)

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HOPPERGRASS AND STICKERBUSH:
a beginning

A Guide to Activities and Strategies in Environmental Education

K - 5

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RATIONALE

The activities and strategies in this guide have been compiled for your convenience to assist you in teaching environmental education. They are designed to facilitate the implementation of the Alachua County elementary objectives in this area. It is our hope that this resource guide will provide a beginning for increased environmental awareness and understanding in your curriculum.

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ENVIRONMENTAL CONCEPTS

The earth is a vast but limited natural system.

The total environment is in constant change.

A living thing is the product of its heredity and environment.

All living things, including man, are interdependent with one another and with their environment.

KINDERGARTEN

OBJECTIVE:

To observe how environment affects man's way of life.

ACTIVITY 1:

Take the class on a short field trip to an attractive location on the school grounds. Read the children a story. After the story, allow the children to chat for a few minutes and then take them back. Later in the day take the class out by the dumpsters and read them another story. After the story give the children a few minutes to sit and chat if they wish. (Hopefully the location will be hot, sandy and littered and they will want to go in). After the children return to the class, divide the class into two groups. Have each group work on a collage mural depicting the two outings. Come to group and discuss the murals and their differences. As the children discuss the aspects of each outing, make a list of likes and dislikes.

1) How did the first location affect our mood and behavior?

2) How did the second location affect our mood and behavior?

3) What could we do to change the surroundings to make them more enjoyable?

4) Was the first location changed by man to make it attractive?

5) Was the second location changed by man to make it unattractive?

6) How does the littered mural make you feel?

7) How does the scenic mural make you feel?

ACTIVITY 2:

Ask the children to put their heads down and close their eyes. Make sounds that break the silence such as slamming a door, dropping a can or yelling. Next, make pleasant sounds. List on the board; sounds we like to hear, sounds we do not like to hear, sounds that help us.

Take students to several listening places. Describe the sounds as either pleasant or unpleasant. Discuss the sources of the sounds. Are they from living or non-living sources? Have the students react to the attributes of sound.

1) Pitch (high, low)

2) Volume (loud, soft)

3) Tone (harsh, mellow)

4) Meaning (messages around us, such as sirens, phone ringing, bells, etc.)

ACTIVITY 3:

Collect pictures of different environments such as desert, lake, winter scene, rain and forest. Place these pictures on a bulletin board. Draw or collect pictures of people to correspond with each environment such as a nomad, a swimmer, a person dressed in an overcoat, a person with an umbrella or raincoat, and a forest ranger. Match the people to their correct environment.

ACTIVITY 4:

Plan a nature walk on the school grounds. Before the trip or walk remind the children to keep in mind all the things not made by man. Have them observe through their senses everything that they see feel, hear, smell, or taste. Remind them of the beautiful world around them and all the things they can enjoy without cost. Their eyes, ears, nose, tongue, and hands can bring exciting adventures to them, if they just stop and think about it. When the children return to the classroom they may close their eyes while the teacher asks them to remember everything they saw.

ACTIVITY 5:

Select different animals, for instance, a fish, a snake, a bird, a turtle, a penguin, a camel, a man, etc. Provide each student with a picture of one of these animals. Have students draw in the environment in which the animal is usually found.

ACTIVITY 6:

The following activities will take a few days to complete. These activities are intended to make the children aware of the similarities and differences in animals.

Have the children describe animals they know well (dog, cat, horse, cow, etc.) Have the children tell how each animal looks, feels, walks, makes sounds.

Now observe pictures of several animals. Magazines, science books, readers and coloring books may be used.

1) Name all the animals that have tails. Are they short or long?

2) Discuss the animals that have no tails.

3) They all have ears, but are all the ears alike? (Discuss those that stand up and those that flap down.)

ACTIVITY 6: (continued)

4) Compare an elephant and a mouse. Observe the similarities: same color, same number of feet, both have tails.

5) Now discuss the differences.

6) What does an elephant have that a mouse does not have? (trunk)

7) What does a mouse have that the elephant does not Have? (whiskers)

8) Compare their size. (large - small)

9) Compare their ears. (mouse-ears stand up: elephant-ears flap down)

10) Have the children dramatize how an elephant walks. Now, change and have them dramatize how a mouse moves. Which is quicker? Louder? Now discuss animal coloration. For example talk about the various colors a dog's hair may be. Do the same with cats, horses, cows, pigs, etc. Now discuss animals that come in "one color" or where they all look the same. (zebra, skunk)

A chart may be made with the headings: Different color; Same color. Use pictures of animals and place them under the correct heading. Example:

Different Color	Same Color
pigs	zebra
bird	lion
cat	elephant
dog	tiger
fish	skunk
squirrel	raccoon
snake	giraffe, etc.
rabbit, etc.	

The children may now be directed to either bring in pictures of animals from magazines, etc. or draw and cut out pictures of them. They may be pasted on a large piece of paper that is attached to the wall. They may be grouped in categories labeled:

Large - Small
Same color - Different color
Long tail - Short tail
Four legs - Two legs

Observe the sounds that different animals make by listening to a tape or record of animal sounds. Have various children imitate the sound of an animal with which they are familiar. Now have a guessing game whereby a leader makes a sound and another child is called on to match the animal. The child answering correctly then becomes the leader.

OBJECTIVE:

To recognize that man often modifies his environment.

ACTIVITY 1:

Litter Laws remind people to keep their environment clean.
Classify Litter Bugs: Have children collect litter from the perimeter of the campus. The litter should be placed in three piles: adult litter, child litter, uncertain litter.

Have children determine a way to stop litter bugs.

1) What should have been done with this litter?

2) Why do people throw down litter?

3) How can we stop this problem of littering?

ACTIVITY 2:

Collect pictures of different environments which man has modified to provide a career such as school, house, farm, hospital, fire station, and police station. Place these pictures on a bulletin board. Draw or collect pictures of people to correspond with each environment such as teacher, parents, farmer, nurse or doctor, fireman, and policeman. Match the people with their correct environment.

ACTIVITY 3:

Build a city. Use wooden blocks, rocks, pebbles, twigs, deer moss, strips of paper for streets, etc. Include stores, gas stations, homes, schools, etc. Use miniature plastic animals and people.

1) What things in the city are living?

2) What things in the city are non-living?

3) If a city were to be built on the playground, what changes would have to be made to the playground?

ACTIVITY 4:

Make a modern city and an Indian village out of clay. Compare ways in which early men adapted to the environment as opposed to ways in which modern men modify the environment. Discuss general areas, such as, food, clothing and shelter.

ACTIVITY 5:

Have students look for pictures of pioneer tools and modern tools, for instance, shovels, hoes and plow, bulldozers, cranes, electric power tools, and tractors.

1) Does man need tools to modify the environment?

2) Did the pioneers have as many tools as we do?

3) Did the pioneers make as many changes in the environment as we do?

4) What are the differences between a pioneer's home and your home? a pioneer's town and your town? a pioneer's lake and your lake? etc.

FIRST GRADE

OBJECTIVE:

To differentiate between plants and animals by their characteristics.

ACTIVITY 1:

Take a field walk around the school yard and nearby area. Encourage the children to use their senses to discover and identify plants and animals.

1) List plants and animals that are the same as, and those that are different from the ones found on the school ground.

2) Take a second walk and see how many different birds, insects, flowers, trees, and small mammals that are located in the area.

3) Each child constructs a booklet by drawing or cutting pictures from magazines of animals and plants they saw and did not see on their walk.

ACTIVITY 2:

Collect seeds or leaves for a classroom display; compare their sizes, shapes and textures. Show in the display how seeds might travel from one location to another.

ACTIVITY 3:

Locate birds, listen to them, observe color and shape. Make a paper mache' bird of one observed in your area.

ACTIVITY 4:

Set up two tables and two bulletin boards. Label one table and one bulletin board PLANTS. Label the other table and bulletin board ANIMALS. Ask the children to bring in living plants and animals and pictures of plants and animals. As the living things and pictures are brought in, the children should help decide on which table or bulletin board the living specimen or picture should be placed. (Children may be surprised to learn that trees, vines, bushes, vegetables and fruits are plants--and that birds, insects, worms and fish are animals.) As the collection grows the plants may be grouped into garden plants, food, weeds, forest or field. Animals might be grouped into farm, pets circus or zoo. Plants may also be grouped into roots, stems, leaves or fruits. Animals may be grouped into flying, swimming, burrowing, etc.

OBJECTIVE:

To recognize that plants and animals live in different types of environments.

ACTIVITY 1:

Find pictures of plants and animals that live near your home. Find pictures that show these living things in fall, winter, spring, and summer. Make a display of these pictures. Use the display to show how living things change with the seasons.

ACTIVITY 2:

Visit a pet shop. Buy a pair of white mice. Also buy a pamphlet on the care of white mice. To make a cage, get an apple box, cover with screen wire, turn it on one side so the children can watch the mice. Place scraps, cloth, excelsior, shredded newspaper, wood shavings, cotton, etc. in the box. Provide food (bread, apple, peanut, oatmeal, lettuce and water). Let the children observe over a period of time. (The mice may not build a nest until ready to produce young.)

ACTIVITY 3:

Take the children on a walk around the neighborhood. Look for animal homes of all kinds, for wild animals and pets.

1) Did the animal make his own home?

2) Did people provide the home?

3) Where did they get the materials?

Have children collect (or draw or paint) pictures of animal homes. Make a scrapbook of these. Some children may want to construct models of homes for an exhibit.

ACTIVITY 4:

Collect animal pictures and pictures of their natural environment. Place the animal pictures on a bulletin board with pockets under each picture. Have a stack of pictures showing different animal environments such as a pond, desert jungle, mountain, and farm. You should have more than one picture of each environment. Have the students place the appropriate environment with its animal. This activity can also be used for plants and their environment.

OBJECTIVE:

To compare the different environments inhabited by individuals.

ACTIVITY 1:

Make a group chart listing the class activities of a day at school. Give each child the opportunity to share their home activities of an entire day. Compare orally a school day's activity with their home activity.

ACTIVITY 2:

Pretend you are lost on an island.

1) What do you need to survive? (food, water, shelter)

2) Where do your requirements come from - animal or plant?

3) Compare what you needed on the island with what you use at home.

4) How much of what you have can you get along without?

ACTIVITY 3:

Have a discussion comparing the different types of homes people live in such as farms, houses, apartments, trailers, houseboats, and tents. After discussing these different environments, pass out drawing paper and have them draw a picture of the place where they live. When they have finished have each child share their picture with the class.

OBJECTIVE:

To identify environmental factors that affect man's way of living, including land, weather, conservation and population.

ACTIVITY 1:

Sit on the floor within a piece of yarn six feet in diameter. What is life like in such a small space? What can you do in this space that is important to you? What can't you do?

ACTIVITY 2:

For each child in the class "plant" a newly sharpened pencil in a box filled with soil. Ask if the pencils are really growing in the soil. Have they ever grown in the soil? Where do we get pencils? Discuss how we should take care of pencils.

"The Unhappy Pencil"

"Ouch," said the pencil as mad as could be,
"Some naughty child is chewing on me!
"I'm not for chewing, I'm filled up with lead
From my red wooden coat to my black sharpened head."
"Your teeth are for chewing, that's easy to see.
But use them at mealtime and not on poor me!"

ACTIVITY 3:

Mark off a section of the room. Within that section have only 2 desks, 1 pile of paper, 2 pencils, one of each of the books a student would need, and a limited amount of any other supplies needed. Assign one child to work and live in the area for 1 day. The next day add 1 more child; 3rd day, 2 more; 4th day, 4 more; 5th day, 6 more.

1) What problems occurred as the population increased?

2) Did everyone have everything they needed?

3) How does this relate to our population problem?

4) Do we have limited amounts of things for people to use?

ACTIVITY 4:

Have a discussion about the various sports. Allow the children to make an association between sports and the weather.

1) Who can name some sports played in the winter?

2) What popular sport is played in the spring?

3) What do most people do in the summer to cool off?

4) What sport is played in the fall?

Children may now be directed to section off a piece of art paper into four parts. They may label the four seasons and then draw the appropriate sport under each.

ACTIVITY 5:

Make a weather calendar and put it in a conspicuous place so it can be observed by all the students. Have the children take turns pinning on the various symbols for each day, e.g., sun for sunny day; raindrops for rainy days; clouds for cloudy days, etc. Have a large thermometer drawn and place it on the bulletin board. Attach a piece of thin red ribbon to it. Also have a regular thermometer hanging outside the classroom door. Allow the children to take turns checking the real thermometer. Then they may return and fold the ribbon to the same degree on the drawn thermometer. The temperature is then recorded on the calendar. Discuss how weather affects our way of living. Bring out such things as changes in leaves, changes in thickness of animals' fur, changes in types of clothing people wear, and foods that animals and humans eat.

ACTIVITY 6:

Set up a fish pond in your room. Make 30 fish out of paper. Attach a paper clip to each fish. Have 15 fishing poles with a magnet on the end of the string. Have one child fish for 2 minutes. Record how many fish he catches. Then have 15 children fish for 2 minutes and record how many fish each caught.

1) Why couldn't you catch as many fish the second time?

2) What would happen if fish wouldn't replenish themselves?

3) What does this show you about population increase?

4) Will there be fewer other things for each person as the number of people increases?

SECOND GRADE

OBJECTIVE:

To distinguish between kinds of plants and animals by identifying their major characteristics and environmental requirements.

ACTIVITY 1:

Take a nature hike and carefully observe colors, designs and patterns found in leaves, branches, and flowers. Bring sample items to the classroom and classify according to pattern, design and colors. Choose a design and do an abstract drawing,using repetition of the pattern.

Optional Ideas:

1) Match colors found in branches,leaves and flowers to the color wheel to teach color recognition and the range of intensity of a given color.

2) Discuss animal coloration and its similarity to the environment for protective purposes. Examples: chameleon, walking stick, anole, and snowshoe rabbit.

ACTIVITY 2:

Take children on a walk in a nearby wooded area to develop the understanding that animals use materials found in their environment to make homes. Encourage children to look around everywhere. Follow up with questions:

1) Name the animal that made the home.

2) Where was the home found?

3) What materials did the animal use?

4) What other animals might live there?

5) Name different places where animals are found.

6) Did you see any homes that are man-made?

ACTIVITY 3:

Provide thirty minutes for the students to observe wildlife in the schoolyard. Have a contest to see which student can make the most extensive wildlife list. (5,171)

ACTIVITY 4:

Take the students on a field trip to a nearby zoo, aquarium, wildlife preserve, or woodland. Prepare an information sheet for the students to take with them to help in the observation of particular animal habits and characteristics. (5, 171)

ACTIVITY 5:

Collect pictures of animals from old magazines. Cut the heads off all the animals and make the pictures available to the students. Instruct the students to select a picture, glue it on construction paper, use crayons or chalk to draw the head on the animal. After the head has been drawn, the animal should be identified by name and labeled accordingly. The students might also profit from using the back of the sheet to draw the animal in its natural habitat. (5,168)

ACTIVITY 6:

Instruct the students to cut pictures of animals from magazines. The pictures may be glued on construction paper. Crayons, chalk or tempera paint may be used to fill in the correct background to show the animals' natural environment. (5,171)

ACTIVITY 7:

Treasure Hunt - Introduce pictures of plants and animals by use of filmstrips. Before going into the outdoor area, look over the list of plants and animals expected to be found in our area. Example: plants (fern, clover, trees, vines, mint) animals (frogs, crickets, grasshoppers, worms). As plants and animals are discovered, they are checked off the list by children.

As a follow up, visit library to look up characteristics for identifying the above plants and animals. Examples: A frog has to keep his skin wet or he will die. Ferns need moist soil in which to grow.

OBJECTIVE:

To distinguish ways that the natural environment affects how man lives in his community.

ACTIVITY 1:

Show pictures of sand, water, insects, worms, and broken pieces of plants. Through group discussions and the use of the library, develop the understanding that in combination, they have the ability to grow our food, shelter and clothing materials.

ACTIVITY 2:

Have children name several products they or their parents have bought at the grocery store,which may be harmful to our environment.
Example - Raid
Thought Questions:
1) Why do you think the product is harmful?
2) What does the label say?

Follow up: Make a bulletin board with labels from harmful products.

ACTIVITY 3:

Man uses materials from his environment for his home. Read the story The Three Little Pigs to your students. Then let the children draw pictures of each house built by the three little pigs. Then discuss where each little pig got the materials it used to build its house. Let the children share the materials used in building their home.

OBJECTIVE:

To examine ways people adapt to their environment and how it influences their way of life.

ACTIVITY 1:

Ask students to imagine themselves marooned on a cold, desolate, snow covered shore, barren of trees and without knives or guns. They need shelter, food, and warm clothing. They would have a chance to bring in one pack-load of things that would not weigh more than they could carry. Ask them to list the things they would ask for and explain why these items were requested.

ACTIVITY 2:

Take your class outdoors and give them the following assignment. Tell the class that they are from a planet in another solar system. "You have just landed your spaceship and are now looking around this new environment. Your commander is asking you to report what you see. Remember that your commander has never seen such things as trees, grass, people, sidewalks, cars, buildings, etc. Create a story telling what you see, hear and feel." For younger children the story can be developed through oral means, while older students can actually write their impressions.

ACTIVITY 3:

Have your school principal turn off the electricity, water, and/or heat for one day. Have your class interview teachers, school workers, and students about their feelings and reactions to what has happened. Try to keep the entire procedure a secret so that reactions will be more natural. Discuss the results of the survey.

THIRD GRADE

OBJECTIVE:

To recognize that the plants and animals within specific environments are interdependent.

ACTIVITY 1:

In order to begin to develop an understanding of succession, change and diversity in nature, children should become aware of the variety of living and non-living things in a particular natural area. Have several children obtain hoola hoops or large hoops made from wire hangers. These should be tossed onto the school grounds or on the grassy surface of a park. Each group should then list the living and non-living things found within the perimeter of the hoop. (Forest area, pastures and lawns can also be used in this manner and the results compared with the school grounds or park area.) This count or listing of the things observed in any area gives a picture as unique as a thumbprint and a feeling for the wide variety of things that make up any part of the environment.

ACTIVITY 2:

After visiting a natural area or focusing attention to the miniature life which abounds in a clump of moss or within the leaf blades of a lawn, ask children to use their wildest imagination and draw a picture of a make-believe animal or plant that might live here.

ACTIVITY 3:

Study a picture of a burned forest, or visit the site of a forest fire. Ask the class to project themselves into that forest as small animals. Where would they go? Where would they live now?

ACTIVITY 4:

Display the following pictures and/or items: pond or swamp water, small insects such as mosquitoes, flies, bees, locally found birds, some small and large animals, plants and trees. After giving the class time to view this arrangement ask:

1) Could all these things live together?

2) Choose one form of life from the display. How would the disappearance of this affect the remaining life?

3) What things could cause the disappearance of this life form?

ACTIVITY 4: (continued)

4) Replace what was removed and take something else away. Repeat the discussion.

5) Aid class in concluding that, in nature, as in all things, even the smallest changes can have large effects.

ACTIVITY 5:

Bring in two jars of water. In one jar, place a plant that lives in water such as a hyacinth. In the other, place a plant that lives in soil. Note the changes that occur after several days. Help children draw conclusions about environmental changes and plant life.

ACTIVITY 6:

Discuss the relationship between trees and Spanish moss with your students. Emphasize the dependence of Spanish moss on trees for their survival. Discuss the relationship between parasites and hosts with your students. Emphasize the absolute dependence of the parasite on its host. Now take the students out on the campus to look for examples of direct dependence. In each case discuss the dependence of one species on the other. Things that you might find on your campus include the following:

Lichens - Trees
Spanish Moss - Trees
Algae - Bark of Trees
Air Plants - Bark of Trees
Insect Galls on Plants
Orchids on Bark
Aphids and Ants

ACTIVITY 7:

"Energy Mobiles" - Using a wire-cutting tool, cut 6 to 8 inch straight pieces from wire coat hangers. Each child will need three such wire pieces. (Have them each bring a hanger from home.) Pass out oaktag or construction paper to be used for the mobile objects. The highest point will be the sun. Hanging from that should be a wire with a different plant hanging at each end. From each plant should hang a wire with a different "eater" at each end. For instance, a child might choose an ear of corn and an apple for his two plants. From the corn could hang a pig and a chicken, and from the apple could hang a boy and a worm. If a smaller mobile is desired, only one plant object need hang from the sun, and two animals from the plant, thus cutting the project completion time in half. Super-strength thread should be used to connect the objects to the wires. (A touch of white glue will keep the thread from sliding). It is recommended that, if construction paper is used, the paper figures be cut double and glued back to back to give better weight to the mobile. Warn the children that they will have to take care to balance their mobile objects so that they will hang

ACTIVITY 7: (continued)

properly. As each mobile is finished, hang them from a light fixture or from some other high place in the room. (Unbent paper clips make excellent hanger hooks.)

Later, when everyone is finished, hold up one mobile and discuss what would happen to the mobile if a plant were removed. (Two animals would fall off.) This is elementary, but a good way to illustrate the interdependence within the food chain. An extra large and more extensive mobile could be a class science project for a school display.

ACTIVITY 8:

Using pupils to represent the components, construct models of two or three simple food chains and then convert them into a food web. Prepare six 12-inch cards lettered with such labels as sun, soil, green plants, mouse, grasshopper, earthworm, snail, frog, shrew, robin, garter snake, rabbit, owl, fox, goldfinch, sparrow hawk, etc. Prepare enough cards to supply about half the class; let the other half serve as audience. You will also need a ball of string which can be cut into convenient lengths and used to connect the links in the food web.

Assign a card to each pupil. Starting with the sun, connect it to green plants by asking the two pupils to hold a length of cord between them.

Now connect one of the plant-eaters to a plant; follow this with a meat-eater linked to a plant-eater. As the first components are added, cross-links begin to be evident and the food web concept is easily developed. At the outset it is advantageous to place the pupils representing the sun and the plants centrally, and then allow the remainder of the web to develop around them.

1) Why is the sun necessary for all life?

2) What is the source of food used by animals?

3) In a natural environment, if all the members of a particular species, such as grasshoppers, were removed from the food web, what would be the effect?

This point can be emphasized by removing the appropriate pupil from the model. As he drops his strings, have any students who had strings connected to the grasshopper drop their strings and so on around the ring.

ACTIVITY 9:

Have your students set up and study a freshwater aquarium in order to better understand food webs and the interrelationships of pond organisms. This activity requires a field trip to a pond site.

As an activity before the trip, divide the class into groups of 3 or 4 students. Have each group pick one of the organisms from the pond organism list as their research organism. The groups should draw a large picture or make cut-outs of their organisms so that a bulletin board display can be made. Each group should try to find where the organism can be found; what the organism eats; if the organism is immature, what it will change into; and any other interesting information. The entire board can be covered with cellophane to represent water.

The bulletin board display will represent a pond community when it is finished. A food web can be constructed by running strings from one organism to all of the things on which it feeds.

Pond Organism List:

1) Plants: stoneworts like Chara; cattails; and hornwort.

2) Animals: crayfish; freshwater shrimp; mayflies; damsel flies; water boatman; marsh treaders or water measurers; water striders or pond skaters; water scorpion; giant waterbug; predaceous diving beetle; mosquito; crane flies; soldier flies; fisher spider; pill clams; orb snail; apple snail; little pond snail; mosquito fish or gambusia; sailfin molly; least killifish; leopard frog; alligator; snapping turtle; red-bellied turtle; softshell turtle; common water snake; cottonmouth or water moccasin.

The students will not find all of the organisms mentioned on the field trip, but most of the insects and fish will be caught. Once the bulletin board display and research are finished, the students will be well prepared for the field trip.

After returning from the field trip and setting up the pond aquaria, you might like to have the students try some of these activities and questions.

1) Have each group develop a booklet on what they observe in their aquarium.

2) Ask the students why the sunlight is important to their aquarium. (photosynthesis)

3) Where do plants get the things they need in order to grow? (nutrients from the water)

ACTIVITY 9: (continued)

4) Why are the plants important to the pond?
(They produce food from sunlight, nutrients, CO_2 and water. This food is the basis for the rest of the food chain.)

5) Why are the animals important to the pond?
(They produce CO_2 and nutrients (waste products and decomposition) for plants.)

6) What are decomposers and how are they important to the pond?
(They decompose dead plants and animals, thereby releasing nutrients for plants which will begin a new cycle of life.)

OBJECTIVE:

To recognize that change is a condition of the earth.

ACTIVITY 1:

Take your students out on the campus to look for examples of predictable change. Though many changes are constantly occurring in the environment, not all of the changes are easily predictable. Many changes, such as seeds germinating, are regular and predictable. Emphasize this point with your students. Other examples of predictable change might include: growth of organisms, the various stages and changes in the life cycle of a butterfly, resurrection fern turning green after a rain, leaves falling, bark shedding from certain trees, death of plants in a heavily used section of the campus, grass grows slower in winter, etc. Do not give these examples to your students before they go outdoors, but do discuss the concept with them. After each student has returned with an example of a predictable change, let the students tell about their finds. Guide them in the right direction through questions. Emphasize the usefulness of recognizing predictable change in our environment. Bring out the idea of man-made changes and what things can be predicted when man makes these changes.

ACTIVITY 2:

Keep a nature calendar. The calendar may be kept on a large calendar or blackboard. Pictures, drawings, actual objects or written records may be kept.

Example - Signs of Fall:

1) Notice the changes in the length of the day, position of the sun, temperature, rainfall, etc.

2) Notice the changes in plants; color, dropping of leaves, ripening fruit, scattering of seeds, dying plants.

3) Notice the behavior of animals; storing food (squirrels and other rodents), migration of birds, disappearance of insects and other animals.

4) Notice changes in the soil; erosion where plants have disappeared.

Some leaves change color, others (evergreens) do not. Some trees lose leaves, others do not. Some plants die every year, (annuals), others keep growing (evergreens). Many plants produce seeds and have special adaptations for scattering seeds.

ACTIVITY 3:

The class could develop a bulletin board display which illustrates various types of environmental changes. They could be further classified as changes caused by nature and changes caused by man. Examples such as: weather, woodland succession, landfill areas, population, reforestation, housing developments, and wildlife could be used. An extension of this activity could be some examples of future environmental changes and ways of preventing or limiting these changes.

OBJECTIVE:

To recognize that there is an uneven distribution of natural resources throughout the world.

ACTIVITY 1:

Using the world atlas as a reference, have the students research the location of various natural resources and mark them on a world map to show the distribution. Use such resources as coal, oil, timber, uranium, nickel, copper, etc. Discuss how this distribution affects the United States.

FOURTH GRADE

OBJECTIVE:

To recognize that adaptation is a continuous process.

ACTIVITY 1:

To illustrate adaptation as continuous within a short period of time, display pictures that represent the four seasons found in northern areas of the country. Allow the children time to observe and name what season is being pictured.

1) What things remind them of each of the four seasons? Make a list of these things on the chalkboard.

2) What sports are played during each season?

Now discuss each season by asking students what changes take place in the living things as well as the non-living things from one season to the next. Bring out such things as changes in leaves, changes in thickness of animals' fur, changes in types of clothes people wear, and foods animals and humans eat.

Ask the students about changes in Florida's seasons.

3) Do the same things happen and the same changes take place here as up North? (not exactly)

4) How many seasons do we have?

5) What do we call our two main seasons? (wet and dry seasons, or rainy summer and dry winter seasons)

6) What changes take place during Florida's two main seasons?

(During wet rainy summer season, plants grow rapidly and are very green. More insects, especially mosquitos. The cypress trees grow new needles. Flowering tends to be during the early part of this time. During the winter dry season many trees (cypress) lose their leaves, the grasses and plants turn brown, swamps dry up, animals must search for water, insect populations decline, not as many flowers are present, and so on.)

7) Do we play the same sports during our seasons as they do up North?

Have your students collect pictures and drawings that show Florida's seasons as well as the Northern seasons. They should place these pictures near each other so that they can compare changes that take place.

8) Why are the changes in the Northern part of the country more pronounced than those in Florida? (Greater temperature change which affects the living and non-living things to a greater degree up North.)

ACTIVITY 2:

To illustrate adaptation as continuous over a few years, discuss the use of DDT as a pesticide and the subsequent development of DDT - resistant strains of flies and mosquitos.

ACTIVITY 3:

To illustrate adaptation as continuous over a long period of time, use a time chart showing the stages in the evolution of the horse. Compare the size and number of toes of the dawn horse, through subsequent horses to the modern horse.

ACTIVITY 4:

To illustrate adaptation as continuous over a long period of time, use a time chart tracing the stages of the evolution of man.

OBJECTIVE:

To describe how plants and animals are adapted to their environments for survival.

ACTIVITY 1:

Exhibit a collection of objects, tools, and devices such as: smooth-edge knife, saw-edge knife, hammer, comb, scissors, needle, bobbie pin, fork, pencil, etc.

Ask regarding each object:

1) Where and under what conditions would you expect it to be used?

2) Why was it designed a special way? Or, what function would it perform?

3) Do living things have a special design if they live in certain places?

4) Tomorrow be ready to share what you know about a plant or animal regarding its body design and how its structure enables it to perform a special way in its environment.

Pupils share information which may include:
Arctic region: polar bear, whose white heavy fur protects him from cold and prey.

Desert region: camel, whose hump enables him to live without frequent food; cactus plant, which stores water but is able to live on little water because it is protected from water loss by tiny leaves (spines).

Tropics: flamingo, whose long legs and beak aid him in gathering food from the water.

Temperature region: hummingbird, whose beak enables him to capture nectar from within deep flowers, serving simultaneously as a pollinator.

1) Do you know other special features some plants and animals have?

2) What plants eat meat?

3) How does "tail design" of animals help them to perform their unique tasks? Foot design? Beak, mouth, teeth design? Wing design? Consider examples of each, such as: tail - beaver; beak - woodpecker; mouth - alligator; teeth - squirrel; wing - buzzard.

1) Where is man's native habitat?

2) The study of what animal helped man learn to fly?

3) How are airplanes like birds in structure?

4) The study of what animal helped man learn to swim, and exist on water?

5) What swimming equipment might have been inspired by observing fish?

6) What special abilities in living creatures are scientists studying in order to find ways to design or improve man-made mechanisms?

ACTIVITY 1:

6) continued

(Example: Common barn owl to learn more about the senses of hearing and sight; the shark to learn how to best protect people who work and play in ocean water.)

Show the collection of objects used in introduction again. Why does man need tools like these to help him do his work? How is man adapted by function and structure to interact with the environment?

ACTIVITY 2:

Collect and study a number of pictures of each type. Note how similar the characteristics are in each group. Examples of each type are:

Carnivores: wolf, puma, lynx, weasel, coyote, wildcat.
Herbivores: deer, elk, moose, bison, woodchuck, rabbit, squirrel, beaver.
Omnivores: bear, racoon, skunk, opossum, fox, muskrat.

Ask the children to note how slender and lithe the members of the cat family (lion, tiger, puma) look in comparison to cattle, sheep, deer.

Carnivores do not have horns. Ask the children to consider why horns might jeopardize a lion's hunting? Ask questions such as:

1) Why do herbivores need horns for protection? Can you find an answer in the open fields where they graze?

2) A horse does not have horns, claws or fangs. What means of protection does it have? (It has an ability to kick, and an ability to run swiftly.)

ACTIVITY 3:

To record tracks of animal visitors, hold regular paper, shelf paper or poster paper over a burning candle. The paper will collect carbon from the smoke and anything that touches the surface will be marked. Use a bait station on the ground filled with food items the students suggest. Place sheets encircling bait at several places around the school grounds. Children should make as many deductions as they can about the animals which made their marks.

1) When the students arrive, allow them to examine the tracks and speculate as to the type of animal which left each set of tracks.'

2) Look at the armadillo's tracks and discuss where this animal lives. (He lives in a burrow which is dug in the ground. Point out the elongated toes and toenails which enable this animal to be such an excellent digger. The teacher may wish to show the replica of each foot while discussing the track it made as this will enable the student to interpret the track more clearly.)

ACTIVITY 3: (continued)

3) Look at the rabbits' tracks and discuss where these animals live. (They do not dig burrows. They use abandoned burrows of other animals or simply make nests of grass and fur in a shallow depression in the ground.)

4) Compare the rabbit's feet with the digging feet such as the armadillo has.

5) Look again at the snowshoe rabbit's track and ask why are their hind feet much larger than those of other rabbits. (It is an advantage for traveling the snow covered regions the snowshoe rabbit inhabits. If you placed him in the environment of the jack rabbit, his feet might slow him down and thus make him an easy victim to his predators.)

6) Discuss the opossum's tracks. Ask where would you look for this animal. (The opossum is adapted to climbing and is often found on the limbs of fruit trees - especially fond of persimmon and pawpaw trees.)

7) Look closely at the pads that have developed on his feet. These pads make it easier for this animal to grasp limbs. When climbing he depends on the grip of his toes as well as his claws and tail. He lives in a tree hole or else digs a ground burrow.

8) Find a set of tracks that you think belongs to an animal which lives in or near the water. (The beaver)

9) Why do you think this animal lives in the water? (The hind toes are webbed together and aid in swimming.)

10) Look at the two bird tracks. Can you tell where you would find these birds? (The blue heron is found in swampy areas where its long toes and long legs allow it to wade in water on muddy bottoms. He obtains his food from the water and along the water's edge and does not swoop down upon his prey. The owl perches in trees and the grasping ability of his feet allows him to swoop down and grasp a mouse or other prey.)

11) Compare the deer and elk tracks. Why are the elk tracks larger than the deer? In what kind of environment does the elk live? What about the deer?

12) How has the environment determined the kind of feet these animals have developed through time?

ACTIVITY 4:

Game: (Mice and Hawks) Cut out several small shapes of mice. Use 10 mice of the following colors each: blue, green, red, yellow, purple, and black. Paste 8 mice on one 5x8 sheet of red paper. Three of the mice should be red (the same as the background color.) Arrange so they are well "hidden". Follow a similar procedure for 5x8 sheets of blue, green, yellow, purple, and black. Now you are ready to play the game. One person in the class is the HAWK. Have the HAWK stand across the room from you. As you flash the card up for about 3 seconds, he is to tell you how many mice he can catch. Ideally he won't be able to see the mice that are the same as the background color. Questions that might arise are: Why was it hard to see the mice that were the same as the background color? How does this apply to animals that change color? Does a color protect them?

Your class could keep a carnivorous pet such as a spider or a chameleon. They can feed it flies, roaches, etc. You can use a plastic milk container (recycling) for the habitat. One side of the container should be cut out and securely covered with plastic wrap so you can see through to observe. The container top should be covered with fine screen to allow for air entry. An old aquarium could be used. Don't forget water. The chameleon could be put on green and then brown paper and should turn the color of the paper it's on.

ACTIVITY 5:

Purchase or color toothpicks in the following pattern: 100 red, 100 green, 100 yellow, 100 blue; leave 100 with their natural color. Take your class outdoors to a grassy spot and mark off a one square meter area. Give a pair of students the following instructions: You are a toothpick eating bird. You have two minutes to capture toothpicks. You can use only one hand; place your other hand in your pocket or behind your back. Allow 4 or 5 pairs of students to try the exercise. Replace the "captured" toothpicks after each trial. Keep a record of the number of each color captured for each trial. Make a bar graph to show the results. Which color was caught the least number of times; the most? Why? Discuss protective coloration. What would happen if a different background were used; for example, dry leaves, sand, etc.?

As a twist to this activity, place a tight rubber band around the thumb and index fingers of one of the "birds". How does this affect captures? Are some "birds" better adapted for hunting toothpicks than others? An eye patch over one eye can also bring some interesting results.

ACTIVITY 6:

A study of lawn weeds can be conducted by comparing a lawn before and after mowing. Have students determine which of the lawn weeds seem to be most successful in adapting to being mowed. Which growth forms do the successful weeds take? Find examples of rosettes, creepers, sprawlers.

ACTIVITY 7:

Take a field trip on the campus and collect several different types of insects, some from above the ground, some at ground level, and some from underground. Place each kind of insect in a different shoe box and cover the boxes with clear plastic, glass or Saran Wrap so that the insects can be seen.

1) What differences can be found in the insects located above the ground, at ground level, and underground? (For instance, body shape, color, type of wings, shape of legs, etc.)

ACTIVITY 8:

If possible compare the feathers of a duck and a chicken to see why the duck's feathers can withstand water and a chicken's cannot.

Flying requires not only wings but a body structure that is light and streamlined, as well as an internal development that can provide the amount of energy necessary for flying. Compare a bird with an airplane, especially a jet plane; its streamlined shape, its retracting landing gear, its energy.

If the skeleton of a bird is available, look for the extra bone that supports the wings. Mammal skeletons lack this bone.

ACTIVITY 9:

Collect pictures; make a mural of various birds and their habitats with some brilliantly colored and others barely observable against their environment.

Make a bird kit on a flannel board. Cut out different types of beaks, legs, bodies, wings, etc. Then, for a given description, select the appropriate parts and construct the bird. Have children name the bird they have built, i.e. curved sharp claws, hooked sharp beak, large body, perching legs and feet, large wings - eagle, hawk, or osprey; short seed eating beak, perching legs and feet, small claws, small body and wings - sparrow, finch, etc.

Examine pictures of beaks and claws of birds. Classify as to use.

ACTIVITY 10:

Have your students locate various trees near your school campus that are oddly shaped. Try to determine what caused the tree to take present shape. Trees near buildings often curve outwards due to lack of light, or become one sided. Look for signs of pruning. Some limbs are destroyed by passing trucks and buses. Look for old wounds on the trunk and signs of terminal bud destruction (pine trees usually will have sharp curve in the trunk due to destruction of terminal bud). Observe wound areas for signs of rot, and for signs of the bark growing over the wound.

ACTIVITY 11:

Materials: Bag of seeds, such as dried beans or peas, balsa wood and/or construction paper, tape, paste or glue, rubber bands, toothpicks, red tempera, balloons, scissors, pencils, plastic bag, pieces of cork, cotton and/or feathers, small metal springs, other useful materials.

Distribute the Activity Cards and give each student a seed to be dispersed. Each card contains a different problem, as follows:

ACTIVITY CARD

Adapt your seed to float on water at least five minutes. Hint: air bubble, raft.

Adapt your seed to float on water at least five minutes.
Adapt your seed with a mechanism that will throw the seed two feet away from the parent plant. Hint: burst, split
Adapt your seed to attract a bird or other animal. Hint: bright, tasty fruits with seeds inside
Adapt your seed to hitchhike on an animal or man for twenty feet.
Adapt your seed to fly at least three feet.

After each student has demonstrated his dispersal invention, follow-up can include the following:

1) What plants actually have features like the seed dispersal mechanism you constructed?

2) What would happen if seed dispersal mechanisms did not exist?

ACTIVITY 12:

Materials: toothpicks, popsicle sticks, rubber bands, glue, scotch tape, string, pins, paper fasteners, cardboard, wire, pipe cleaners, natural materials found at study site.

Take the group to any outdoor study area, such as a field, stream, woods, lawn or vacant lot. Assign study areas. Ask students to locate any materials in their plot which might be "prey" (food) for animals living in, or passing through the area. (Seeds, eggs, roots, vegetation, insects, slugs, worms, mice, and other organisms may be prey).

When prey have been isolated, have students try to build simple devices analogous to the claws, beaks, and jaws of likely predators. Use simple materials from the classroom and whatever can be found on the study site.

For a more structured experience, distribute Activity Card to each student, as follows:

ACTIVITY CARD

Make a predator device for breaking nuts and eating the meat.

Make a predator device that could catch or pick up an egg.
Make a predator device that could catch a flying insect.
Make a predator device that could dig up roots.
Make a predator device that could pick up leaves.
Make a predator device for getting at animals that live underground.
Make a predator device that a meat eater would use.
Make a predator device for breaking nuts and eating the meat.

Follow-up this activity with discussion as follows:

1) Why are there so many different kinds of predator devices?

2) What would happen if every animal had the same predator device?

3) What adaptations do prey have so as to avoid being eaten by predators?

Have everyone look for predators in the study site and decide what kind of prey they are adapted to eat.

ACTIVITY 13:

Materials: Fantasy Film Liquid Plastic (or cellophane, plasticene, or any material for constructing models of plants), roll of floral tape, scissors, wire, small styrofoam or clay base to support wire frames while plastic is drying.

ACTIVITY 13: (continued)

Distribute Activity Cards. Each card contains a different problem for students to solve, as follows:

ACTIVITY CARD

Invent a plant that can live on the surface of a pond.

Invent a plant that can live on the surface of a pond.
Invent a plant that can withstand high winds.
Invent a plant that grazing animals would not eat.
Invent a plant that can hold on to rocks in swift rivers and streams.
Invent a plant to catch insects.
Invent a plant adapted to store water.
Invent a plant that can compete with other plants for sunlight.
Invent a plant that is lawnmower-proof.

Directions for use of Fantasy Film:

1) Form the wire into a basic petal or leaf shape and contour it as you wish.

2) Dip the shaped wire into the Fantasy Film.

3) Stand wire in styrofoam or clay to dry.

4) Group petals together into flower or plant form.

5) Wrap stems with floral tape.

6) Add plastic leaves to stem as you wrap it.

Follow-up might include asking students to make inferences about the probable habitat and unique features of each plant.

1) Where is each plant best suited to live?

2) How would each plant be unsuited for different habitats?

3) How are plants adapted to seasonal changes?

Take a campus field trip and find real plants that have the same adaptations that the models have.

OBJECTIVE:

To discover ways man has learned to use plants and animals.

ACTIVITY 1:

List the plants and animals which man uses in the construction of shelters. Have students bring in pictures illustrating examples.

ACTIVITY 2:

List the plants and animals which man uses as food. Have students bring in examples or pictures.

ACTIVITY 3:

List the plants and animals which man uses for making clothing. Have students bring in examples of different types.

ACTIVITY 4:

Discuss with students sea products that are economically valuable to the community. Have students research the nutritional value of several local seafoods. Consider such things as protein, calcium, minerals, and calories.

ACTIVITY 5:

Materials: small amounts of the following herbs: dill; chives; mint; basil; thyme; marjoram, rosemary, tarragon, sage, chervil, and savory.

Introduce each herb individually so that confusion will not occur in regard to the different tastes and odors. After team-research has disclosed the history and use of the herbs, plan a "herb party" in which the various teams prepare and present sample foods in which herbs have been used.

Suggestions for the "herb party" menu as follows -

Dill: Sprinkle on boiled potatoes.
Chives: Mix with cottage or cream cheese.
Mint: Place sprigs in iced tea.
Basil: Spread on sliced tomatoes.
Thyme: Place small pieces in fish chowder.
Marjoram: Sprinkle on soup.
Rosemary: Place on broiled or fried chicken.
Tarragon: Place two tablespoons of the crushed leaves in one-third pint of vinegar.
Sage: Mix with bread and milk to make sage-stuffing.
Chervil: Garnish on fried or chopped boiled eggs.
Savory: Sprinkle on string beans or other vegetables.

ACTIVITY 6:

Refer to the Vegetable Bowl unit which is available in your school media center.

ACTIVITY 7:

Invite a pharmacist to visit the classroom to share ways that plants and herbs are used in medicines.

ACTIVITY 8:

Have students make a bulletin board showing a tree and the products man derives from it.

Americans use an average of 500 pounds of paper per year. The demands for wood, paper and various products of the forest are enormous. To be able to print one edition of the Sunday New York Times for just 1 million people, 140 acres of timber (pulpwood) are needed.

1) For 1 million people, how many acres of timber must be cut for a year of Sunday papers. For a paper each day? (Multiplying that amount for the millions of U.S. citizens makes one realize that it is a staggering amount of pulpwood that is used each year.)

   A bulletin board might be arranged with a newspaper in the center, emphasizing the facts surrounding this one paper item. This should illustrate volume, supply and demand. Research the paper industry and report how paper is produced. Make a list of other paper products and stress again the vast numbers of trees that must be grown for industry to meet our demands.

2) As our population grows, how will this affect our resources?

3) Discuss space for homes and how this might affect the acres set aside for timber farms and our agricultural needs.

4) What other wood products do we use? (Look around the room and see how many wood products you can name.)

5) What about our homes? Do we use wood in their construction? (public buildings, etc.)

6) How is wood used for fuel? (to make charcoal, alcohol, etc.)

7) What other by-products do we get from trees? (fruit, nuts, syrup, rubber, etc.)

8) What kinds of trees are grown in Florida? How are they used? (slash pine for pulp, citrus for fruit; many ornamentals for decoration, etc.)

   There are so many interesting aspects to this concept that booklets could be made including reports, illustrations, etc., and compiled

ACTIVITY 8: (continued)

by students individually, or in combined efforts for a class scrapbook. Possible topics might include: paper products, wood products, paint products from wood, different forest species, types of forest harvesting, maps of U.S. forest areas, maps of Florida forest areas, etc.

ACTIVITY 9:

Have students: Find out what kinds of wood are used in the making of a box, a barrel, a pail, a picture frame, tool handles.

Find out what kinds of wood are used in the making of telephone poles, masts of ships, railroad ties, fence rails, flag poles.

Find out what kinds of wood are used in the making of tennis rackets, skis, baseball bats, bows and arrows, golf clubs.

Find out what kinds of wood are used in the making of clothes baskets, sewing baskets, market baskets.

Find out what kinds of plants from which we obtain rattan, bamboo, oakum, manila, jute, burlap. How is each kind used?

Find out what part of a plant is used in making wicker furniture, a straw hat, paper, excelsior, cellophane.

Display samples of the various types of wood listed above.

ACTIVITY 10:

Suggest to students that they: write short stories telling how wood products help them live more comfortable lives; write poems expressing feelings about forests and their value to us; make lists of suggestions for conserving our forests and their products; write slogans or mottoes to be used to promote an awareness of the need to preserve and use our resources wisely.

ACTIVITY 11:

Make a chart of forestry terms (such as; seedling, sapling, pulpwood, sawtimber, poles, piling) with definitions of each. Make a list of forestry products (lacquers, cellophane, paper, all types of wood). Have U.S. maps available. Display just before the scheduled arrival of a local forester whom the teacher has invited to visit the class to discuss with pupils "How Forests Affect our Lives". The forester will bring some materials and literature basic to a study of the need for forests and for some ways to care for them.

1) What trees grow in our community?

2) What are their needs?

3) How can we help to protect them?

ACTIVITY 12:

Form small groups to make preparation for a panel discussion. Encourage students to use words which have been defined. Ask them to report orally after discussion in groups on choices of:

How Trees Help Us In Our Community
In What Ways Trees Help Man in General
How Trees Help Birds and Animals
How Trees Help Save and Enrich Soil
Foods and Important Products We Get From Trees
How Trees Help Make Our Lives More Pleasant

Ask pupils to use reference books to learn how trees help keep the air fresh.

ACTIVITY 13:

Suggest related activities:

Ask pupils to make a collection of actual items made from trees. Make a collection of advertisements of wood products. Display samples. Write a class letter to appropriate state agencies and lumber industries for suitable materials on forests.

Make a pictorial map of the United States showing where particular kinds of trees grow best.

Use a state map to show or list trees native to your state. (List those imported from other parts of the world.) Make a scrapbook for class (or individual use) with wood or heavy cardboard cover.

ACTIVITY 14:

Plan a field trip to a nearby state forest or park (or national forest or park) with the local forester. The forester will tell students what to observe. After the trip let them write letters to their parents telling them the importance of trees and ways in which they can work together to help protect them. From the forestry division, a pulp or paper company, or a nearby nursery get a seedling for each child. Plan with the children how to plant it in the yard or other chosen spot. Remind them that it is their responsibility to help these seedlings grow and develop, and that each must learn the needs of these living things.

ACTIVITY 15:

On a table place a flowering plant with bright flowers. On a book rack place the book Life's Extras by Archibald Rutledge or another book of similar content.

1) What is beauty?

2) What does beauty mean to you?

ACTIVITY 15: (continued)

3) Is beauty a necessity or is it just an extra?

Using two charts, Things That Are Necessary and Things That Are Extras, make lists with the students.

1) Are the songs of the birds necessary or extras?

2) Do we need beautiful things as well as things that keep our bodies alive?

3) If we need them, then are they really extras?

4) Isn't it hard to separate the necessary things from the extras?

ACTIVITY 16:

Have them look for beauty as they go home, when they arrive home, and on the way back to school.

1) Where did you find beauty?

2) At what time did you find it?

3) Did you see anything to mar the beauty of the road that you traveled to school?

4) How were these ugly places made?

5) Can beauty be measured?

6) What is meant by the term "natural beauty"?

Give each student a copy of the poem America the Beautiful. Ask them to read the poem carefully and try to see and feel each word picture. Read the poem in unison.

1) Would each of you like to enlist as a guardian in the battle to preserve natural beauty?

Make a list of suggestions.

1) What is your responsibility for conserving beauty?

2) What can you do to keep this beauty or to improve upon it?

Give students an opportunity to do creative writing.

ACTIVITY 17:

Take an aesthetics field trip to a city or state park. The aesthetic aspects of nature and creative activities for students are stressed during this trip.

ACTIVITY 18:

Present the following short narrative to the class:

You and your spouse live in a home on property adjoining a refreshing lake. In the valley town below live your parents and many friends. You have happy memories of your childhood spent in the village, and as you watch the village children playing in the stream that flows down the hill from your lake, you recall how pleasant those moments were for you on hot summer days. This memory is more vivid now that a mining company wants to buy part of your hillside and the lake. There is a strong possibility that the company's operations would pollute the lake and stream. This would be resented by the townspeople, most of whom are your friends. Some families use the stream for drinking water when their wells get low. However, from your point of view, the sale of part of your property would permit you to pay the balance of your mortgage and provide some welcome extra cash.

Ask the students to react to the situation orally or in a written assignment. Following the discussion, you might change the situation so that selling the hillside and the lake becomes more of an economic necessity. It would be interesting to note whether or not the students' points of view change. To extend the activity, have students compose situations which require that similar choices be made.

1) Do you have an obligation to the townspeople ? Explain.

2) Are these obligations more important than providing financial security for your family?

3) What are the responsibilities of the mining company?

4) How will you resolve this dilemma?

FIFTH GRADE

OBJECTIVE:

To recognize that the earth is a limited natural system.

ACTIVITY 1:

The local stores have all announced that due to a transportation strike there will be no more candy bars for an extended period of time.

What will happen to the present supply? How will the supply be distributed? Will there be restrictions as to how many bars each person will be permitted to buy? What will happen to the price? What will happen to you emotionally if there are no restrictions and someone ahead of you buys the last box of bars? What will you be willing to do to get some of those bars?

ACTIVITY 2:

When a resource becomes more scarce, the law of supply-and-demand forces up the price. When it is too expensive for most users, there is a shift to a replacement resource. The shift from oil and gas to coal for the generation of electric power is an example.

Have the class list 10 of their favorite possessions that are made from oil or gas (synthetic fibers, plastics) and then discuss what might happen to the cost and availability of these items as oil and gas become less available.

ACTIVITY 3:

Who's Eating What? Have your class divide into groups of twos and then go outdoors. Each group should delineate a one square meter area on campus. Students should look for evidence of what animals have been eating. Look for scats, casts, leaves that have been chewed, or any other second hand proof of an animal's presence. If any living animals are found, students should try to establish the trophic level and the position of the animal in its food web. Do some areas show more evidence than others? Why? Do some plants seem to be used more as a food source than others? Why? How do shade areas compare to sunny areas?

ACTIVITY 4:

Build a food web using members of the class. Prepare cards from pieces of paper about four inches by eight inches with large labels, such as soil, green plants, mouse, grasshopper, earthworm, snail, frog, shrew, robin, garter snake, rabbit, owl, fox, sparrow, and sparrowhawk. Make enough cards for half the class.

Assign a card to each pupil. Starting with "soil," connect a piece of string about ten feet long to "green plants." These two pupils should stretch the string between them. Then connect some herbivore to "green plants." Follow this with a carnivore linked to herbivore. At first the web will look more like a food chain. But as more plants and animals are connected, cross-links begin to appear. Connect any animal that feeds upon a plant or animal with the plant or animal. Soon, the food web will begin to appear.

The other members of the class who have been observing may act as scientists and investigate a problem. What would happen in an ecosystem if all the members of a type of animal such as grasshoppers were removed from the food web? Have "grasshopper" leave the food web. What do you observe?

In our ecosystem, what would happen if all of the predators (insect-eating or meat-eating birds and animals) were removed from the food web? Have these pupils leave the food web. What do you observe? What would happen in an ecosystem if all the predators increased? As a part of the food web, how does man differ from all the other living creatures?

As you learned about the interdependence of plants and man and animals, you could see the need to be alert to dangers to our food supply on Earth. Are any of your food sources in danger of being polluted? Are any sources of food for plants and animals in danger? If these food sources are in danger, what may happen to man? What can you do to protect your food supply?

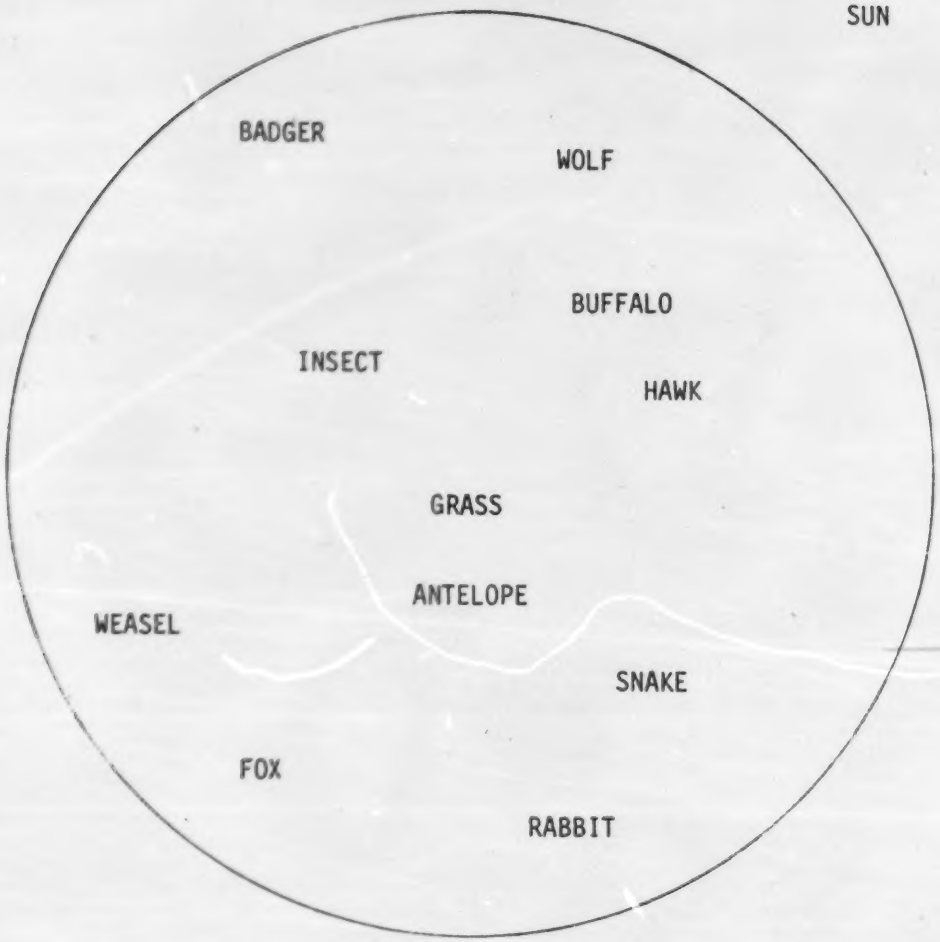
ACTIVITY 5:

Study the prairie food chart (see next page). Draw an arrow from each feeder to the food it feeds on. Grass in the center of the chart is the primary source of food for all the organisms.

What does the grass depend on for food? Which grasseater in the web also eats meat? What effect would a grass shortage have on the grazers and predators?

Some feeders have arrows pointing to many food sources. How might this be an advantage over organisms that eat one kind of food?

ACTIVITY 5: (continued)



Additional activities for this objective can be found in the Environmental Field Investigations on Environmental Habitats and Forest. (See grade level chairperson).

OBJECTIVE:

To identify ways in which man modifies his environment in order to utilize available resources.

ACTIVITY 1:

Take a field trip to determine ways in which you might improve the environment around your school to make it more pleasant for plants, people, and other animals. Take steps to make some of these improvements. Do you sometimes have to make choices? Does the definition of conservation, "the wise use of resources for the largest number for the longest time," help in making these choices?

ACTIVITY 2:

Discuss renewable resources (trees) as opposed to nonrenewable resources(metals). Invite a representative from a pulp or paper company to discuss recently developed uses of wood products. (A film may be substituted). Have students prepare a display of tree products which are substitutes for metal containers. Suggest that interested students make a scrapbook to illustrate uses of forest and tree products.

ACTIVITY 3:

Have the children pretend they are early colonists in America. Ask them to choose an available occupation, stating their geographic location and the natural resources they would use in earning that living. This could also tie in with an Indian study and the work done by some tribes. As a follow-up, discuss today's occupations and their relationship with nature.

ACTIVITY 4:

Ask the children to name their parent's occupations and list these on the board, noting duplications. Discuss and star any occupation which is directly dependent on the natural resources in your area such as fishing, park rangers, tourist trades, farmers. Lead the class into a discussion dealing with the ways the entire community would be affected if there were drastic changes in the environment.

ACTIVITY 5:

To demonstrate how man depends on his natural environment for his occupation, have the children take part in some role-playing activities. Use the following as a basis:

1) Depict two farmers - one who followed the advice of his county agent and used his land wisely, the other who misused his land. Note results.

ACTIVITY 5: (continued)

2) Portray a group of fishermen who over-fish an area despite warnings from environmentalists. Compare him with fishermen who help protect their industry.

3) Show a group of tourists visiting a local beach. Have them horrified of the trash and debris found there. What do they do? What happens to the local concession stands and tourist businesses?

Additional activities for this objective can be found in the Environmental Field Investigations on Environmental Habitats and Forest. (See grade level chairperson.)

OBJECTIVE:

To recognize that the interaction of biological and cultural traits results in the adaptation of man to his environment.

ACTIVITY 1:

The student will research the lifestyles of the Australian aborigines, the Eskimos and the Kalahari Desert tribes. What are their energy resources? What implications are there for us if we are faced with severely restricted energy resources? How would the student modify his lifestyle? Justify the choices.

ACTIVITY 2:

The student will classify the following items either as physical inheritance or cultural inheritance. Discuss the reasons for placing each item in the chosen category.

eye color	cleanliness	skin color
dress	kind of money	accent
hair color	shape of nose	kinds of houses
cut of hair	language	kinds of jokes
		kind of food

Choose several of these items and explore the variations found in different physical and cultural environments. How do these differences help an individual adapt to his particular environment?

ACTIVITY 3:

Invite visitors from various ethnic groups, foreign countries, or even other parts of the country and have them explain differences in cultural patterns from their own backgrounds. Discuss how this may have affected their adjustment to their present environment.

OBJECTIVE:

To compare ways that man's use of the earth has modified the physical environment, affecting man both positively and negatively.

ACTIVITY 1:

On streets with heavy traffic, a concentration of dirt can sometimes be seen on the lower stories of the buildings, visible evidence of pollution from motor vehicles. One of the most destructive gases, carbon monoxide, is colorless and odorless. It damages plants (notice trees that grow where buses idle their motors). It also gives people headaches and, of course, in quantity, kills.

Take a field trip to discover ways in which automobiles cause pollution. Check the hood of a car that has just parked for thermal pollution. Consider the effect of thousands of automobiles on the temperature of a city. Compare the temperature of black-topped streets to that of grass. Notice spots on streets where oil, gas, and other substances have leaked. Shoes, rugs, and floors all suffer and deteriorate because of these products. Notice clouds of smoke and unpleasant odors from some exhausts.

ACTIVITY 2:

Direct student to find some part of the landscape where undesirable environmental changes have resulted from human usage. (Littered area, buildings crowded together, highways and roads which left unpleasant scars, buildings neglected and in need of paint, and repairs, etc.)

Student will make a drawing or painting of his chosen area as it could be with proper planning and effort. Encourage much realistic embellishment of the area.

ACTIVITY 3:

The electric company wants to build a facility on the only available land in a particular area. In order to secure this land, it must present its case for placing the plant in a wildlife section. The local conservationists oppose the project and will present their reasons for their opposition. Some students can write to the electric company and ask them how they select sites for plants and what benefits these plants bring to the community that outweigh the destruction of more of our natural environment. Other students can find out how conservationists argue for the preservation of our natural environment. The rest of the class will act as the town officials who have the power to grant or deny the company's petition. This might be set up as a panel discussion. Consider the advantages for having the new plant:

1) As the community grows, the supply of electrical energy must keep pace.

ACTIVITY 3: (continued)

2) Jobs will be provided.

3) The plant will provide additional tax money for the community.

Consider the disadvantages in having the new plant:

1) A natural area will be destroyed.

2) Camping, picnicking and fishing no longer can be enjoyed by the community.

Consider the following questions in your discussion:

1) How would the development of a power plant alter an environment?

2) Does the electric company have a right to build its facility no matter what the cost is in terms of injuring the environment? Why?

3) Do you have a right to the comforts available from the company's operation ? (heat, light) Why?

4) What is the company's responsibility if it exercises a right to build and to produce electrical energy?

5) What is your responsibility as the receiver of the company's product?

ACTIVITY 4:

Set up a classroom experiment and extend it outdoors:

1) Plant about six lima bean seeds in a container of soil. Water them and keep them in a sunny location.

2) At the same time, drop six seeds in a styrofoam cup and fill the cup about 1/3 full of water.

3) Keep these conditions constant for several weeks.

Would differing amounts of water in soil cause similar effects? (Yes). Why don't both sets of seeds look the same? (The environments were different and that affected the organism's appearance.) Do you think both sets of seeds had the same potential for growth? (Yes, even though their heredity is the same, they turned out differently).

ACTIVITY 4: (continued)

Have the students go outdoors and look for examples of the environment modifying hereditary characteristics. After each student has found an example, discuss the action that caused the change. Return to the classroom and let the students list as many examples of this concept as they can in fifteen minutes. Examples to look for outdoors would include: diseased plants, broken trees, leaves chewed by insects, mown grass, and even a bird feather would show that a bird has been changed.

Additional activities for this objective can be found in the Environmental Habitats and Forest. (See grade level chairperson).

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Additional or Revised Activities
for Environmental Guide

TEAR HERE

Grade level:

Objective:

Materials (if needed):

Activity:

TEAR HERE

Please return to:

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